Express Mail No: EL844533742US Docut: C1039 7057 (HCL/MAT)

```
<110> Davis, Heather L.
      Krieg, Arthur M.
      Schorr, Joachim
      Wu, Tong
```

<120> Vectors and Methods for Immunization or Therapeutic Protocols

```
<130> C1039/7057 (HCL/MAT)
      <140> not yet assigned
      <141>
      <150> US 09/082,649
      <151> 1998-05-20
      <150> US 60/047,233
      <151> 1997-05-20
      <150> US 60/047,209
      <151> 1997-05-20
     <160> 84
     <170> FastSEQ for Windows Version 3.0
     <210> 1
     <211> 20
      <212> DNA
      <213> Artificial Sequence
      <220>
      <223> synthetic oligonucleotide
      <400> 1
tccatgtcgt tcctgtcgtt
      <210> 2
      <211> 19
      <212> DNA
      <213> Artificial Sequence
```

<223> synthetic oligonucleotide <400> 2 tcctgacgtt cctgacgtt

> <210> 3 <211> 24 <212> DNA <213> Artificial Sequence

20

19

	<220> <223> synthetic oligonucleotide	
	<221> misc feature	
	<222> (0)(0)	
	<223> Has a phosphorothioate backbone.	
tegtes	<400> 3 gtttt gtcgttttgt cgtt	24
5 .		
	<210> 4	
	<211> 30	
	<212> DNA	
	<213> Artificial Sequence	
	<220>	
	<223> synthetic oligonucleotide	
	<400> 4	2.0
ccgtgg	gatat ccgatgtacg ggccagatat	30
	<210> 5	
	<211> 32	
	<212> DNA	
	<213> Artificial Sequence	
	<220>	
	<223> synthetic oligonucleotide	
	<400> 5	
agtcg	cggcc gcaatttcga taagccagta ag	32
•	<210> 6	
	<211> 35	
	<212> DNA	
	<213> Artificial Sequence	
	<220>	
	<223> synthetic oligonucleotide	
	400 6	
attot	<400> 6 cgagt ctagactaga gctcgctgat cagcc	35
acce	cgage ceagaceaga geeegeegae eagee	
	<210> 7	
	<211> 29	
	<212> DNA	
	<213> Artificial Sequence	
	<220>	
	<pre><220> <223> synthetic oligonucleotide</pre>	
	72207 Syntheete Offgondereottae	
	<400> 7	
attag	geett ecceageatg cetgetatt	29
	<210> 8	

<211> 37 <212> DNA <213> Artificial Sequence	
<220> <223> synthetic oligonucleotide	
<400> 8 tataggccct attttaaacg cgccctgtag cggcgca	37
<210> 9 <211> 38	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 9	
ctatggcgcc ttgggcccaa tttttgttaa atcagctc	38
<210> 10	
<211> 28	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 10	
aaattcgaaa gtactggacc tgttaaca	28
<210> 11	
<211> 30	
<212> DNA	
<213> Artificial Sequence	
<220>	~
<223> synthetic oligonucleotide	
<400> 11	•
cgtgttaaca ggtccagtac tttcgaattt	30
<210> 12	
<211> 44	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 12	
gactccatga cgttcctgac gtttccatga cgttcctgac gttg	44
<210> 13	
<211 > 44	

·. · · ·

<212> <213>	DNA Artificial Sequence	
<220>	gymthatig aliganyglootida	
<223>	synthetic oligonucleotide	
<400>		44
5, 101111		
<210>		
<211>		
<212> <213>	Artificial Sequence	
<220>		
<223>	synthetic oligonucleotide	
<400>	14	
gacttcgtgt	cgttettetg tegtetttag egetteteet gegtgegtee ettg	54
<210>	15	
<211>		
<212>		
<213>	Artificial Sequence	
<220>		
<223>	synthetic oligonucleotide	
<400>		
gactcgtcgt	tttgtcgttt tgtcgtttcg tcgttttgtc gttttgtcgt tg	52
<210>		
<211>		
<212>	Artificial Sequence	
(213)	Arctitetar bequence	
<220>		
<223>	synthetic oligonucleotide	
<400>		20
gccctagtac	tgttaacttt aaagggccc	29
<210>	17	
<211>	29	
<212>		
<213>	Artificial Sequence	
<220>		
<223>	synthetic oligonucleotide	
<400>		
ggcgggccct	ttaaagttaa cagtactag	29
<210>		
<211>		
<212>	DNA	

<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 18	
gccctggcgg ggataaggcg gggatttggc gggggataag gcggggaa	48
<210> 19	
<211> 45	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 19	
ggcccccgcc ttatccccgc caaatccccg ccttatcccc gccag	45
<210> 20	
<211> 38	
<212> DNA <213> Artificial Sequence	
Value Alciticiai bequeñoc	
<220>	
<223> synthetic oligonucleotide	
<400> 20	
gccctatttt aaattcgaaa gtactggacc tgttaaca	38
<210> 21	
<211> 37	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 21	
cgtgttaaca ggtccagtac tttcgaattt aaaatag	37
<210> 22	
<211> 20	
<212> DNA <213> Artificial Sequence	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 22	_
cacacacaca cacacacaca	20
<210> 23	
<211> 29	
<212> DNA <213> Artificial Sequence	
ALCITICIAL DOGACTION	

	<220>	
	<223> synthetic oligonucleotide	
	<400> 23	
gtct	ctagac agccactggt aacaggatt	29
-		
	<210> 24	
	<211> 29	
	<212> DNA	
	<213> Artificial Sequence	
	<220>	
	<223> synthetic oligonucleotide	
	1200 571101100110 01115011110120101111	
	<400> 24	
atca	ttgtgt cgtcaagtca gcgtaatgc	29
geeg	etgtgt tgttaagtaa gogtaatgt	20
	<210> 25	
	<211> 20	
	<211> 20 <212> DNA	
	<213> Artificial Sequence	
	. 220.	
	<220>	
	<223> synthetic oligonucleotide	
	400. 25	
4	<400> 25	20
tegt	ttctgt aatgaaggag	∠0
	.010. 00	
	<210> 26	
	<211> 20	
	<212> DNA	
	<213> Artificial Sequence	
	<220>	
	<223> synthetic oligonucleotide	
	.400. 26	
	<400> 26	2.0
aagg	cagttc cataggatgg	20
	010 05	
	<210> 27	
	<211> 35	
	<212> DNA	
	<213> Artificial Sequence	
	<220>	
	<223> synthetic oligonucleotide	
	<400> 27	-
tcga	tetgeg attecaacte gtecaacate aatac	35
	<210> 28	
	<211> 20	
	<212> DNA	
	<213> Artificial Sequence	

<220> <223> synthetic oligonucleotide	
<400> 28 tggtgagaat ggcaaaagtt	20
<210> 29	
<211> 21	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 29	21
cattattcat tcgtgattgc g	
<210> 30	
<211> 24 <212> DNA	
<212> DNA <213> Artificial Sequence	
<220> <223> synthetic oligonucleotide	
<400> 30	24
acgteteagg aacaetgeea gege	
<210> 31	
<211> 20	
<212> DNA <213> Artificial Sequence	
(213) HICITIOIAL DOJAN	
<220>	
<223> synthetic oligonucleotide	
<400> 31	20
agggatcgca gtggtgagta	
<210> 32	
<211> 21	
<212> DNA <213> Artificial Sequence	
<213> Artillicial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 32	21
tataaaatgc ttgatggtcg g	
<210> 33	
<211> 35	
<212> DNA <213> Artificial Sequence	
<z13> Altilitat bequence</z13>	
<220>	

<22	3> synthetic oligonucleotide	
<40	0> 33	
gggaagagg	c ataaattotg toagooagtt tagto	35
	0> 34	
	1> 20 .2> DNA	
	3> Artificial Sequence	
~21	32 ALCILICIAL DEGLECIEC	
<22	0>	
<22	3> synthetic oligonucleotide	
	00 > 34	0.0
tggcttccc	a tacaagcgat	20
<21	.0> 35	
	1> 20	
<21	2> DNA	
<21	3> Artificial Sequence	
•		
<22	:0> :3> synthetic oligonucleotide	
<22	33 Synthetic Oligondeleotide	
<40	00> 35	
tacattato	g cgagcccatt	20
	.0> 36	
	.1> 19 .2> DNA	
	.3> Artificial Sequence	
\2.1	3) Altititud begataet	
<22	20>	
<22	23> synthetic oligonucleotide	
	00> 36	19
cggccccga	ac gtttcccgt	19
<21	10> 37	
<21	11> 29	
	L2> DNA	
<21	13> Artificial Sequence	
-05	20>	
	23> synthetic oligonucleotide	
	00> 37	
atcgaatto	ca gggcctcgtg atacgccta	29
-0-	10. 20	
	10> 38 11> 39	
	12> DNA	
	13> Artificial Sequence	
	20>	
<22	23> synthetic oligonucleotide	

* ,

<400> 38	
tgacttgacg acacaacgac agctcatgac caaaatccc	39
<210> 39	
<211> 39	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 39	
ctccttcatt acagaaacga ctttttcaaa aatatggta	39
<210> 40	
<211> 37	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
(223) Synthetic Oligonacieotiae	
<400> 40	
ccatcctatg gaactgeett ggtgagtttt eteette	37
ceatectaty gaactycott gytgagttet caccate	57
<210> 41	
<211> 34	
<212> DNA	
<213> Artificial Sequence	
-	
<220>	
<223> synthetic oligonucleotide	
<400> 41	
gagttggaat cgcagatcga taccaggatc ttgc	34
<210> 42	
<211> 37	
<212> DNA	
<213> Artificial Sequence	
-220-	
<220>	
<223> synthetic oligonucleotide	
<400> 42	
aacttttgcc attctcacca gattcagtcg tcactca	37
adultity accordance gardeaging tracted	37
<210> 43	
<211> 39	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	

<400> 43 cgcaatcacg aatgaataat ggtttggttg atgcgagtg	39
<210> 44 <211> 38	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 44	38
tggcagtgtt cctgagacgt ttgcattcga ttcctgtt	
<210> 45	
<211> 38	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 45	38
tactcaccac tgcgatccct ggaaaaacag cattccag	
<210> 46	
<211> 39	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 46	39
ccgaccatca agcattttat acgtactcct gatgatgca	
<210> 47	
<211> 39	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 47	39
cagaatttat gcctcttccc accatcaagc attttatac	33
<210> 48	
<211> 38	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 48	
✓ TO 4 >	

	atcgcttgta t	gggaagcca gatgegccag agttgttt	38
	<210>	49	
	<211>	37	
	<212>	DNA	
	<213>	Artificial Sequence	
	<220>		
	<223>	synthetic oligonucleotide	
	<400>		
•	aatgggctcg c	egataatgta gggcaatcag gtgegae	37
	<210>		
	<211>		
	<212>		
	<213>	Artificial Sequence	
	<220>		
	<223>	synthetic oligonucleotide	
	<400>		
	acgggaaacg t	ccgaggccac gattaaattc caacatgg	38
	<210>	51	
	<211>	20	
	<212>	DNA	
	<213>	Artificial Sequence	
	<220>		
	<223>	synthetic oligonucleotide	
	<221>	misc_feature	
	<222>	(0)(0)	
	<223>	Has a phosphorothicate backbone.	
	<400>	51	
	tccatgacgt t	ccetgacgtt	20
	<210>	52	
	<211>	20	
	<212>	DNA	
	<213>	Artificial Sequence	
	<220>		
	<223>	synthetic oligonucleotide	
		misc_feature	
		(0)(0)	
	<223>	Has a phosphorothioate backbone.	
	<400>		
	ggggtcaacg t	tgaggggg	20
	<210>	53	
	-211	30	

<212> DNA <213> Artificial Sequence	
<220> <223> synthetic oligonucleotide	
<400> 53	20
tccaggactt tcctcaggtt	
<210> 54	
<211> 20	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 54	20
tccaggactt ctctcaggtt	
<210> 55	
<211> 20	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 55	20
cccccccc cccccccc	
<210> 56	
<211> 20	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<221> misc_feature	
<2225 (0) (0)	
<223> Has phosphodiester backbone.	
<400> 56	20
tccatgacgt tcctgacgtt	
<210> 57	
<211> 20	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 57	20
aacadcadca acaacaacaa	20

```
<210> 58
     <211> 20
     <212> DNA
     <213> Artificial Sequence
     <220>
     <223> synthetic oligonucleotide
      <221> misc feature
      <222> (0)...(0)
      <223> Backbone is phosphorothioate--phosphodiester
            chimera
      <400> 58
                                                                        20
tccatgacgt tcctgacgtt
      <210> 59
      <211> 20
      <212> DNA
      <213> Artificial Sequence
      <223> synthetic oligonucleotide
      <221> misc_feature
      <222> (0)...(0)
      <223> Has SOS-ODN backbone with two S-linkages at the 5'
            end, five S-linkages at the 3' end, and O-linkages
            in between.
      <400> 59
                                                                        20
ggggtcaacg ttgaggggg
      <210> 60
      <211> 20
      <212> DNA
      <213> Artificial Sequence
      <220>
      <223> synthetic oligonucleotide
      <400> 60
tctcccagcg tgcgccatat
                                                                         20
      <210> 61
      <211> 21
      <212> DNA
      <213> Artificial Sequence
      <223> synthetic oligonucleotide
      <400> 61
                                                                         21
ggggtctgtg cttttggggg g
```

```
<210> 62
     <211> 20
     <212> DNA
     <213> Artificial Sequence
     <220>
     <223> synthetic oligonucleotide
      <400> 62
                                                                         20
tcaggggtgg ggggaacctt
      <210> 63
      <211> 20
      <212> DNA
      <213> Artificial Sequence
      <223> synthetic oligonucleotide
                                                                         20
       <400> 63
ggggttgacg ttttgggggg
       <210> 64
       <211> 20
       <212> DNA
       <213> Artificial Sequence
       <223> synthetic oligonucleotide
       <400> 64
                                                                          20
 tctagcgttt ttagcgttcc
        <210> 65
        <211> 20
        <212> DNA
        <213> Artificial Sequence
        <223> synthetic oligonucleotide
        <400> 65
                                                                           20
  tcgtcgttgt cgttgtcgtt
         <210> 66
         <211> 24
         <212> DNA
         <213> Artificial Sequence
         <223> synthetic oligonucleotide
         <221> misc_feature
         <222> (0)...(0)
         <223> Backbone is a phosphorothioate--phosphodiester
               chimera.
```

<400> 66	
tegtegtttt gtegttttgt egtt	24
<210> 67	
<211> 22	
<212> DNA	
<213> Artificial Sequence	
•	
<220>	
<223> synthetic oligonucleotide	
<400> 67	
tegtegttgt egttttgteg tt	22
<210> 68	
<211> 20	
<212> DNA	
<213> Artificial Sequence	
(21) Attititat begatate	
<220>	
<223> synthetic oligonucleotide	
<2235 Synthetic Origonacieotide	
2001, ming Foothing	
<221> misc_feature <222> (0)(0)	
<223> Has a phosphodiester backbone.	
<400> 68	
	20
tccatgacgt tcctgatgct	20
(210) (0	
<210> 69	
<211> 15	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
.400 60	
<400> 69	3.5
gcgttttttt ttgcg	15
<210> 70	
<211> 20	
<212> DNA	
<213> Artificial Sequence	
000	
<220>	
<223> synthetic oligonucleotide	
400 50	
<400> 70	~ ^
tccatgagct tcctgatgct	20
010 51	
<210>, 71	
<211> 20	
<212> DNA	
<213> Artificial Sequence	

<220> <223> synthetic oligonucleotide	
<400> 71 tccatgtcgt tcctgatgct	20
<210> 72 <211> 20	
<211> 20 <212> DNA	
<213> Artificial Sequence	
<220> <223> synthetic oligonucleotide	
22233 Syntheorg 11-3	
<400> 72	20
tccatgtcgt tcctgatgcg	
<210> 73	
<211> 20	
<212> DNA	
<213> Artificial Sequence	
<220> <223> synthetic oligonucleotide	
<223> synthetic dilgonalistati	
<400> 73	20
tccatgtcgt tccgcgcgcg	
<210> 74	
<211> 20	
<212> DNA	
<213> Artificial Sequence	
<220> <223> synthetic oligonucleotide	
<223> Synthetic Offgords	
<400> 74	20
tecatgtegt teetgeeget	
<210> 75	
<211> 20	
<212> DNA	
. <213> Artificial Sequence	
<220>	
<223> synthetic oligonucleotide	
<400> 75	20
geggegggeg gegegeee	
<210> 76	
<211> 20	
<212> DNA <213> Artificial Sequence	
20135 ArtitlClal Dequence	

```
<220>
     <223> synthetic oligonucleotide
      <400> 76
                                                                        20
gcgcgcgcgc gcgcgcgcgc
      <210> 77
      <211> 20
      <212> DNA
      <213> Artificial Sequence
      <220>
      <223> synthetic oligonucleotide
       <400> 77
                                                                         20
ccggccggcc ggccggccgg
       <210> 78
       <211> 20
       <212> DNA
       <213> Artificial Sequence
       <220>
       <223> synthetic oligonucleotide
       <400> 78
                                                                          20
 tccatgccgt tcctgccgtt
        <210> 79
        <211> 20
        <212> DNA
        <213> Artificial Sequence
        <223> synthetic oligonucleotide
        <400> 79
                                                                           20
  tccatgacgt tcctgatgct
        <210> 80
         <211> 1360
         <212> DNA
         <213> Artificial Sequence
         <220>
         <223> plasmid DNA wild-type Kanamycin resistance gene
         <400> 80
                                                                           60
   aagggeeteg tgataegeet atttttatag gttaatgtea tggggggggg ggggaaagee
   acgttgtgtc tcaaaatctc tgatgttaca ttgcacaaga taaaaatata tcatcatgaa
                                                                           120
   caataaaact gtctgcttac ataaacagta atacaagggg tgttatgagc catattcaac
                                                                           180
   gggaaacgtc gaggccgcga ttaaattcca acatggatgc tgatttatat gggtataaat
                                                                           240
   gggctcgcga taatgtcggg caatcaggtg cgacaatcta tcgcttgtat gggaagcccg
                                                                           300
   atgcgccaga gttgtttctg aaacatggca aaggtagcgt tgccaatgat gttacagatg
                                                                           360
   agatggtcag actaaactgg ctgacggaat ttatgcctct tccgaccatc aagcatttta
                                                                           420
    tecgtactee tgatgatgea tggttactea ceaetgegat ecceggaaaa acageattee
                                                                           480
```

```
540
aggtattaga agaatateet gatteaggtg aaaatattgt tgatgegetg geagtgttee
tgcgccggtt gcattcgatt cctgtttgta attgtccttt taacagcgat cgcgtatttc
                                                                       600
gtctcgctca ggcgcaatca cgaatgaata acggtttggt tgatgcgagt gattttgatg
                                                                       660
acgagegtaa tggetggeet gttgaacaag tetggaaaga aatgeataaa ettttgeeat
                                                                       720
tctcaccgga ttcagtcgtc actcatggtg atttctcact tgataacctt atttttgacg
                                                                       780
aggggaaatt aataggttgt attgatgttg gacgagtcgg aatcgcagac cgataccagg
                                                                       840
atcttgccat cctatggaac tgcctcggtg agttttctcc ttcattacag aaacggcttt
                                                                       900
ttcaaaaata tggtattgat aatcctgata tgaataaatt gcagtttcat ttgatgctcg
                                                                       960
atgagttttt ctaatcagaa ttggttaatt ggttgtaaca ctggcagagc attacgctga
                                                                      1020
                                                                      1080
cttgacggga cggcgcaagc tcatgaccaa aatcccttaa cgtgagtttt cgttccactg
agegteagae eeegtagaaa agateaaagg atettettga gateettttt ttetgegegt
                                                                      1140
aatctgctgc ttgcaaacaa aaaaaccacc gctaccagcg gtggtttgtt tgccggatca
                                                                      1200
aqaqetacca actetttttc cgaaggtaac tggettcagc agagcgcaga taccaaatac
                                                                      1260
tqttcttcta gtgtagccgt agttaggcca ccacttcaag aactctgtag caccgcctac
                                                                      1320
atacctcgct ctgctaatcc tgttaccagt ggctgctgcc
                                                                      1360
      <210> 81
      <211> 1360
      <212> DNA
      <213> Artificial Sequence
      <220>
      <223> plasmid DNA mutant Kanamycin resistance gene
      <400> 81
aaqqqcctcq tqatacqcct atttttatag gttaatgtca tggggggggg ggggaaagcc
                                                                        60
                                                                       120
acgttgtgtc tcaaaatctc tgatgttaca ttgcacaaga taaaaatata tcatcatgaa
caataaaact gtctgcttac ataaacagta atacaagggg tgttatgagc catattcaac
                                                                       180
gggaaacgtc gaggccacga ttaaattcca acatggatgc tgatttatat gggtataaat
                                                                       240
gggctcgcga taatgtaggg caatcaggtg cgacaatcta tcgcttgtat gggaagccag
                                                                       300
atqcgccaqa gttgtttctg aaacatggca aaggtagcgt tgccaatgat gttacagatg
                                                                       360
agatggtcag actaaactgg ctgacagaat ttatgcctct tcccaccatc aagcatttta
                                                                       420
tacgtactec tgatgatgea tggttactea ceaetgegat eeetggaaaa acagcattee
                                                                       480
aggtattaga agaatateet gatteaggtg aaaatattgt tgatgegetg geagtgttee
                                                                       540
tgagacgttt gcattcgatt cctgtttgta attgtccttt taacagcgat cgcgtatttc
                                                                       600
                                                                       660
qtctcqctca ggcgcaatca cgaatgaata atggtttggt tgatgcgagt gattttgatg
                                                                       720
acgagogtaa tggctggcct gttgaacaag tctggaaaga aatgcataaa cttttgccat
tctcaccaga ttcagtcgtc actcatggtg atttctcact tgataacctt atttttgacg
                                                                       780
aggggaaatt aataggttgt attgatgttg gacgagttgg aatcgcagat cgataccagg
                                                                       840
                                                                       900
atcttgccat cctatggaac tgccttggtg agttttctcc ttcattacag aaacgacttt
                                                                       960
ttcaaaaata tggtattgat aatcctgata tgaataaatt gcagtttcat ttgatgctcg
atqaqttttt ctaatcaqaa ttqqttaatt qqttqtaaca ctggcagagc attacgctga
                                                                      1020
                                                                      1080
cttgacgaca caacgacagc tcatgaccaa aatcccttaa cgtgagtttt cgttccactg
agogtoagac coogtagaaa agatoaaagg atottottga gatoottitt ttotgogogt
                                                                      1140
aatctgctgc ttgcaaacaa aaaaaccacc gctaccagcg gtggtttgtt tgccggatca
                                                                      1200
agagetacea actetttte egaaggtaac tggetteage agagegeaga taccaaatac
                                                                      1260
                                                                      1320
tgttcttcta gtgtagccgt agttaggcca ccacttcaag aactctgtag caccgcctac
                                                                      1360
atacctcgct ctgctaatcc tgttaccagt ggctgctgcc
      <210> 82
      <211> 269
      <212> PRT
      <213> Artificial Sequence
      <220>
      <223> mutant Kanamycin resistance gene
```

```
<400> 82
Met Ser His Ile Gln Arg Glu Thr Ser Arg Pro Arg Leu Asn Ser Asn
Met Asp Ala Asp Leu Tyr Gly Tyr Lys Trp Ala Arg Asp Asn Val Gly
Gln Ser Gly Ala Thr Ile Tyr Arg Leu Tyr Gly Lys Pro Asp Ala Pro
                           40
Glu Leu Phe Leu Lys His Gly Lys Gly Ser Val Ala Asn Asp Val Thr
                       55
Asp Glu Met Val Arg Leu Asn Trp Leu Thr Glu Phe Met Pro Leu Pro
                   70
                                       75
Thr Ile Lys His Phe Ile Arg Thr Pro Asp Asp Ala Trp Leu Leu Thr
Thr Ala Ile Pro Gly Lys Thr Ala Phe Gln Val Leu Glu Glu Tyr Pro
                               105
Asp Ser Gly Glu Asn Ile Val Asp Ala Leu Ala Val Phe Leu Arg Arg
                           120
Leu His Ser Ile Pro Val Cys Asn Cys Pro Phe Asn Ser Asp Arg Val
                       135
Phe Arg Leu Ala Gln Ala Gln Ser Arg Met Asn Asn Gly Leu Val Asp
                   150
                                       155
Ala Ser Asp Phe Asp Asp Glu Arg Asn Gly Trp Pro Val Glu Gln Val
               165
                                   170
Trp Lys Glu Met His Lys Leu Leu Pro Phe Ser Pro Asp Ser Val Val
           180
                               185
Thr His Gly Asp Phe Ser Leu Asp Asn Leu Ile Phe Asp Glu Gly Lys
                           200
                                               205
Leu Ile Gly Cys Ile Asp Val Gly Arg Val Gly Ile Ala Asp Arg Tyr
                       215
Gln Asp Leu Ala Ile Leu Trp Asn Cys Leu Gly Glu Phe Ser Pro Ser
                   230
                                       235
Leu Gln Lys Arg Leu Phe Gln Lys Tyr Gly Ile Asp Asn Pro Asp Met
               245
                                   250
Asn Lys Leu Gln Phe His Leu Met Leu Asp Glu Phe Phe
            260
                               265
      <210> 83
      <211> 3987
      <212> DNA
      <213> Artificial Sequence
      <220>
      <223> plasmid pUK21-A2
      <400> 83
                                                                     60
gaattcgagc tcccgggtac catggcatgc atcgatagat ctcgagtcta gactagagct
cgctgatcag cctcgactgt gccttctagt tgccagccat ctgttgtttg cccctcccc
                                                                    120
gtgccttcct tgaccctgga aggtgccact cccactgtcc tttcctaata aaatgaggaa .
                                                                     180
240
agcaaggggg aggattggga agacaatagc aggcatgctg gggaaggcct cggactagtg
                                                                     300
gegtaatcat ggtcataget gtttcctgtg tgaaattgtt atccgctcac aattccacac
                                                                     360
aacatacgag ccgcggaagc ataaagtgta aagcctgggg tgcctaatga gtgagctaac
                                                                     420
tcacattaat tgcgttgcgc tcactgcccg ctttccagtc gggaaacctg tcgtgccagc
                                                                     480
tgcattaatg aatcggccaa cgcgcgggga gaggcggttt gcgtattggg cgctcttccg
                                                                     540
cttcctcgct cactgactcg ctgcgctcgg tcgttcggct gcggcgagcg gtatcagctc
                                                                     600
```

660 actcaaaggc ggtaatacgg ttatccacag aatcagggga taacgcagga aagaacatgt gagcaaaagg ccagcaaaag gccaggaacc gtaaaaaggc cgcgttgctg gcgtttttcc 720 ataggeteeg ceceetgae gageateaea aaaategaeg eteaagteag aggtggegaa 780 840 accegacagg actataaaga taccaggegt ttececetgg aageteecte gtgegetete 900 ctgttccgac cctgccgctt accggatacc tgtccgcctt tctcccttcg ggaagcgtgg cgctttctca tagctcacgc tgtaggtatc tcagttcggt gtaggtcgtt cgctccaagc 960 tgggctgtgt gcacgaaccc cccgttcagc ccgaccgctg cgccttatcc ggtaactatc 1020 1080 gtettgagte caacceggta agacaegaet tategeeaet ggeageagee aetggtaaea ggattagcag agcgaggtat gtaggcggtg ctacagagtt cttgaagtgg tggcctaact 1140 1200 acggctacac tagaagaaca gtatttggta tctgcgctct gctgaagcca gttaccttcg 1260 gaaaaagagt tggtagctct tgatccggca aacaaaccac cgctggtagc ggtggttttt 1320 ttgtttgcaa gcagcagatt acgcgcagaa aaaaaggatc tcaagaagat cctttgatct 1380 tttctacggg gtctgacgct cagtggaacg aaaactcacg ttaagggatt ttggtcatga 1440 gcttgcgccg tcccgtcaag tcagcgtaat gctctgccag tgttacaacc aattaaccaa 1500 ttctgattag aaaaactcat cgagcatcaa atgaaactgc aatttattca tatcaggatt 1560 atcaatacca tatttttgaa aaagccgttt ctgtaatgaa ggagaaaact caccgaggca 1620 qttccatagg atggcaagat cctggtatcg gtctgcgatt ccgactcgtc caacatcaat 1680 acaacctatt aatttcccct cgtcaaaaat aaggttatca agtgagaaat caccatgagt gacgactgaa tccggtgaga atggcaaaag tttatgcatt tctttccaga cttgttcaac 1740 aggccagcca ttacgctcgt catcaaaatc actcgcatca accaaaccgt tattcattcg 1800 tgattgcgcc tgagcgagac gaaatacgcg atcgctgtta aaaggacaat tacaaacagg 1860 1920 aatcgaatgc aaccggcgca ggaacactgc cagcgcatca acaatatttt cacctgaatc 1980 aggatattct tctaatacct ggaatgctgt ttttccgggg atcgcagtgg tgagtaacca tgcatcatca ggagtacgga taaaatgctt gatggtcgga agaggcataa attccgtcag 2040 2100 ccagtttagt ctgaccatct catctgtaac atcattggca acgctacctt tgccatgttt cagaaacaac totggcgcat cgggcttccc atacaagcga tagattgtcg cacctgattg 2160 cccgacatta tcgcgagccc atttataccc atataaatca gcatccatgt tggaatttaa 2220 tegeggeete gaegttteee gttgaatatg geteataaca eeeettgtat taetgtttat 2280 2340 gtaagcagac agttttattg ttcatgatga tatattttta tcttgtgcaa tgtaacatca 2400 gagattttga gacacaacgt ggctttcccc cccccccca tgacattaac ctataaaaaat aggegtatea egaggeeett tegtetegeg egttteggtg atgaeggtga aaacetetga 2460 cacatgcagc tcccggagac ggtcacagct tgtctgtaag cggatgccgg gagcagacaa 2520 2580 qcccqtcagg gcgcgtcagc gggtgttggc gggtgtcggg gctggcttaa ctatgcggca 2640 tcagagcaga ttgtactgag agtgcaccat aaaattgtaa acgttaatat tttgttaaaa 2700 ttegegttaa attittgtta aateagetea ttitttaaee aatagaeega aateggeaaa atecettata aateaaaaga atageeegag atagagttga gtgttgttee agtttggaae 2760 2820 aagagtccac tattaaagaa cgtggactcc aacgtcaaag ggcgaaaaaac cgtctatcag 2880 ggcgatggcc caccccgatt tagagcttga cggggaaagc cggcgaacgt ggcgagaaag 2940 gaagggaaga aagcgaaagg agcgggcgct aaggcgctgg caagtgtagc ggtcacgctg 3000 cgcgtaacca ccacacccgc cgcgcttaat gcgccgctac agggcgcgta ctatggttgc tttqacqtat qcqqtqtqaa ataccqcaca qatqcqtaaq qaqaaaatac cqcatcagqc 3060 gccattcgcc attcaggctg cgcaactgtt gggaagggeg atcggtgcgg gcctcttcgc 3120 3180 tattacgcca gctggcgaaa gggggatgtg ctgcaaggcg attaagttgg gtaacgccag ggttttccca gtcacgacgt tgtaaaacga cggccagtga attgtaatac gactcactat 3240 3300 agggcgaatt ggggatcgat ccactagttc tagatccgat gtacgggcca gatatacgcg 3360 ttgacattga ttattgacta gttattaata gtaatcaatt acggggtcat tagttcatag 3420 cccatatatg gagttccgcg ttacataact tacggtaaat ggcccgcctg gctgaccgcc caacgacccc cgcccattga cgtcaataat gacgtatgtt cccatagtaa cgccaatagg 3480 3540 gactttccat tgacgtcaat gggtggagta tttacggtaa actgcccact tggcagtaca tcaagtgtat catatgccaa gtacgccccc tattgacgtc aatgacggta aatggcccgc 3600 ctggcattat gcccagtaca tgaccttatg ggactttcct acttggcagt acatctacgt 3660 3720 attagtcatc gctattacca tggtgatgcg gttttggcag tacatcaatg ggcgtggata 3780 geggtttgac tcacggggat ttccaagtct ccaccccatt gacgtcaatg ggagtttgtt 3840 ttggcaccaa aatcaacggg actttccaaa atgtcgtaac aactccgccc cattgacgca 3900 aatgggcggt aggcgtgtac ggtgggaggt ctatataagc agagctctct ggctaactag 3960 agaacccact gcttactggc ttatcgaaat tgcggccgcc acggcgatat cggatccata

```
<210> 84
<211> 3987
<212> DNA
<213> Artificial Sequence
<220>
<223> plasmid pGT
```

<400> 84 60 gaattcgagc tcccgggtac catggcatgc atcgatagat ctcgagtcta gactagagct 120 cgctgatcag cctcgactgt gccttctagt tgccagccat ctgttgtttg cccctcccc gtgccttcct tgaccctgga aggtgccact cccactgtcc tttcctaata aaatgaggaa 180 240 300 agcaaggggg aggattggga agacaatagc aggcatgctg gggaaggcct cggactagtg 360 ccggaatcat ggtcatagct gtttcctgtg tgaaattgtt atccgctcac aattccacac 420 aacateeggg eegeggaage ataaagtgta aageetgggg tgeetaatga gtgagetaae tracattaat tergttrege tractgroug etttreagte gggaaacetg regtgrouge 480 tgcattaatg aatcggccaa cgcgcgggga gagccggttt ccgtattggc cgctcttccg 540 ettecteget cactgacteg etgegetegg tegttegget geggegageg gtateagete 600 660 actcaaaggc ggtaatacgg ttatccacag aatcagggga taacgcagga aagaacatgt 720 gagcaaaagg ccagcaaaag gccaggaacc gtaaaaaggc cgcgttgctg gcgtttttcc ataggeteeg eecceetgae gageateaea aaaategaeg etcaagteag aggtggegaa 780 accegacagg actataaaga taccaggegt tteceeetgg aageteeete gtgegetete 840 etgtteegae eetgeegett aceggataee tgteegeett teteeetteg ggaagegtgg 900 cgctttctca tagctcacgc tgtaggtatc tcagttcggt gtaggtcgtt cgctccaagc 960 tgggctgtgt gcacgaaccc cccgttcagc ccgaccgctg cgccttatcc ggtaactatc 1020 gtcttgagtc caacceggta agacaegaet tategeeact ggeageagee aetggtaaca 1080 1140 ggattagcag agcgaggtat gtaggcggtg ctacagagtt cttgaagtgg tggcctaact acggctacac tagaagaaca gtatttggta tctgcgctct gctgaagcca gttaccttcg 1200 gaaaaagagt tggtagctct tgatccggca aacaaaccac cgctggtagc ggtggttttt 1260 ttgtttgcaa gcagcagatt acgcgcagaa aaaaaggatc tcaagaagat cctttgatct 1320 tttctacggg gtctgacgct cagtggaacg aaaactcacg ttaagggatt ttggtcatga 1380 1440 gcttgcgccg tcccgtcaag tcaccggaat gctctgccag tgttacaacc aattaaccaa 1500 ttctgattag aaaaactcat ccagcatcaa atgaaactgc aatttattca tatcaggatt 1560 atcaatacca tatttttgaa aaagccgttt ctgtaatgaa ggagaaaact caccgaggca 1620 gttccatagg atggcaagat cctggtatcg gtctgcaatt ccgactcggc caacatcaat 1680 acaacctatt aatttcccct catcaaaaat aaggttatca agtgagaaat caccatgagt 1740 aactactgaa teeggtgaga atggeaaaag tttatgeatt tettteeaga ettgtteaac aggecageca ttacgeteat catcaaaate ggaageatea accaaacegt tatteatteg 1800 ggattgagcc tgagccagac ggaatacgcg gtcgctgtta aaaggacaat tacaaacagg 1860 1920 aatggaatgc aaccggcgga ggaacactgc cagagcatca acaatatttt cacctgaatc 1980 aggatattct tctaatacct ggaatgctgt ttttccgggg atagcagtgg tgagtaacca tgcatcatca ggagtacgga taaaatgctt gatggtcgga agaggcataa attccgtcag 2040 2100 ccagtttagt ctgaccatct catctgtaac atcattggca acgctacctt tgccatgttt 2160 caqaaacaac teeggegegt egggetteee atacaagegg tagattgtag cacetgattg 2220 cccgacatta tcgcgagccc atttataccc atataaatca gcatccatgt tggaatttaa 2280 tegeggeetg gaggttteee gttgaatatg geteataaca eeeettgtat taetgtttat gtaagcagac agttttattg ttcatgatga tatattttta tcttgtgcaa tgtaacatca 2340 gagattttga gacacaccgg ggctttcccc cccccccca tgacattaac ctataaaaaat 2400 2460 ageogtatee egaggeeett eegtetegeg egtteeggtg atgeeggtga aaacetetga 2520 cacatgcagc teceggagae ggteacaget tgtetgtaag eggatgeegg gageagaeaa 2580 gcccgtcagg gcgcgtcagc gggtgttggc gggtgtcggg gctggcttaa ctatgcggca 2640 tcagagcaga ttgtactgag agtgcaccat aaaattgtaa ccgttaatat tttgttaaaa 2700 ttcgcgttaa atttttgtta aatcagctca ttttttaacc aatagaccga aatcggcaaa

atcccttata aatcaaaaga atagcccgag atagagttga gtgttgttcc agtttggaac 2760 aagagteeac tattaaagac egtggaetee acegteaaag geegaaaaac egtetateag 2820 gccgatggcc caccccgatt tagagcttga cggggaaagc cggcgcgcgt gccgagaaag 2880 gaagggaaga aaccgaaagg agcggccgct aagccgctgg caagtgtagc ggtcccgctg 2940 cgcgtaacca ccacacccgc cgcgcttaat ccgccgctac agggcgcgta ctatggttgc 3000 tttgccgtat gcggtgtgaa ataccgcaca gatccgtaag gagaaaatac cgcatcagcc 3060 gccatccgcc attcaggctc cgcaactgtt gggaaggccg atcggtgcgg gcctctccgc 3120 tattccgcca gctgccgaaa gggggatgtg ctgcaagccg attaagttgg gtaccgccag 3180 ggttttccca gtcacggcgg tgtaaaccga cggccagtga attgtaatcc gactcactat 3240 aggcegaatt ggggacegat ceactagtte tagateegat gtaegggeea gatataegeg 3300 ttgacattga ttattgacta gttattaata gtaatcaatt acggggtcat tagttcatag 3360 3420 cccatatatg gagttccgcg ttacataact tacggtaaat ggcccgcctg gctgaccgcc caacgacccc cgcccattga cgtcaataat gacgtatgtt cccatagtaa cgccaatagg 3480 gactttccat tgacgtcaat gggtggagta tttacggtaa actgcccact tggcagtaca 3540 tcaagtgtat catatgccaa gtacgccccc tattgacgtc aatgacggta aatggcccgc 3600 etggcattat geccagtaea tgacettatg ggaettteet aettggeagt aeatetaegt 3660 attagtcatc gctattacca tggtgatgcg gttttggcag tacatcaatg ggcgtggata 3720 geggtttgae teaeggggat ttecaagtet ceaececatt gaegteaatg ggagtttgtt 3780 ttggcaccaa aatcaacggg actttccaaa atgtcgtaac aactccgccc cattgacgca 3840 aatgggcggt aggcgtgtac ggtgggaggt ctatataagc agagctctct ggctaactag 3900 agaacccact gcttactggc ttategaaat tgcggccgcc acggcgatat cggatccata 3960 3987 tgacgtcgac gcgtctgcag aagcttc